

A review of the centipede genus *Tidops* Chamberlin (Scolopendromorpha, Scolopocryptopidae, Newportiinae)

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Abstract

The neotropical genus *Tidops* Chamberlin, 1915 is reviewed and its geographical distribution is extended. The genus is now composed of four species – *T. simus* Chamberlin, 1915, *T. collaris* (Kraepelin, 1915), *T. balzanii* (Silvestri, 1895), and a new species described from the state of Bahia, in Brazil, named as *Tidops nisargani*. An amended diagnosis for each species is given. The monotypic genus *Kartops* Archey, 1923 was examined for the first time and the species *K. guianae* Archey, 1923 shown to be conspecific with *T. collaris*, and is therefore a junior synonym of *T. collaris*. The type species, *T. simus*, which was only known from Grenada, Lesser Antilles, is recorded for the first time from Brazil, *T. balzanii* from Bolivia and *T. collaris* from Venezuela, respectively.

Keywords

Chilopoda, *Newportia*, *Kartops*, Taxonomy, Neotropical, Brazil

Introduction

Tidops is a Neotropical genus of scolopendromorph centipedes described by Chamberlin (1915) for *Newportia*-like species with short tarsungula and coxosternal dentiform tooth plates. They are small scolopendromorphs between 19 to 35 millimeters long with light to pale orange body color and cephalic plate and ultimate legs reddish orange. Three species have been recognized by Schileyko and Minelli (1999): *Tidops simus* Chamberlin, 1915, *T. collaris* (Kraepelin, 1903) and *T. balzanii* (Silvestri, 1895). The first species is known only from Grenada, Lesser Antilles, *T. collaris* was recorded from Guyana, Brazil and Paraguay, and *T. balzanii* from Brazil and Paraguay (Schileyko and Stagl 2004). The similar conformation of the ultimate pair of legs shared by species of *Tidops* and *Newportia* Gervais, 1847, led some authors in the past to describe some species of *Tidops* under *Newportia*. However, Schileyko and Minelli (1999) noted for the first time that the structure of the forcipular coxosternum was different in those genera. Because of this, two species, *N. collaris* and *N. balzanii* were transferred to *Tidops* and *N. bicegoi* Brölemann, 1905 and *T. echinopus* Chamberlin, 1921 were synonymized under *T. collaris*. Schileyko and Minelli's (1999) study was restricted to some synonymical notes. Therefore in this paper the species of *Tidops* and a related and enigmatic genus *Kartops* Archey, 1923 are revised.

Repository acronyms are as follows: AMNH—American Museum of Natural History, New York, New York, USA; BMNH—Natural History Museum, London, England; IBSP—Instituto Butantan, São Paulo, São Paulo, Brazil; MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA; MNRJ—Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; MNHN—Muséum National d'Histoire Naturelle, Paris, France; MPEG—Museu Paraense Emilio Goeldi, Belém, Pará, Brazil; NMNH—National Museum of Natural History, Smithsonian Institution, Washington, D. C., USA; ZMH—Zoologisches Museum Hamburg, Hamburg, Germany; ZMUC—Natural History Museum of Denmark (Zoologisk Museum), Copenhagen, Denmark and CMNZ—Canterbury Museum, Christchurch, New Zealand.

Descriptive terminology follows Lewis et al. (2005) and Bonato et al. (2010).

Results

Taxonomy

Family Scolopocryptopidae Pocock, 1896

Subfamily Newportiinae Pocock, 1896

Diagnosis. Median-sized to small scolopocryptopids, general body color brown, dark or pale yellow, cephalic plate reddish brown and legs yellow. Cephalic plate, tergites and sternites normally smooth, with or without short incomplete sutures

starting on the posterior border of the cephalic plate; with or without a pair of spiracles on the seventh pedal segment, last tergite always margined, sternites usually longer than wide, with coxopleural processes, ultimate legs elongated and relatively slender, prefemora of the ultimate legs with three or more and femur and tibia with or without spinous processes. Second tarsus divided in “pseudoarticles”.

Included genera. *Newportia* and *Tidops*.

Distribution. Neotropical.

***Tidops* Chamberlin, 1915**

<http://species-id.net/wiki/Tidops>

Tidops Chamberlin, 1915: 495. Attems, 1930: 284. Bücherl, 1941a: 341. Schileyko & Minelli, 1999: 293. Schileyko, 2002: 483. Schileyko & Stagl, 2004: 125.

Kartops Archey, 1923: 113.

Type species. *Tidops simus* Chamberlin, 1915 (by monotypy).

Diagnosis. Small Newportiinae, cephalic plate with two short incomplete sutures at the posterior border; forcipular coxosternum with short tarsungula, only the apices overlap in closed position; coxosternal tooth plates dentiform; 7th pedal segments without spiracles; first tergite with anterior transverse sulcus giving rise to paired furcate sutures extending posteriorly in a “W-shaped” configuration, with two paired sutures arising from base of former, angling slightly laterally to posterior margin; tibia of the ultimate legs without spines or spinous process, very much thicker than the tarsus 1, somewhat clavately widening distad and at ventral corner of distal end bearing a cylindric process; tarsus 1 with or without a distal ventral expansion.

Included species. *T. simus*, *T. collaris*, *T. balzanii* and *T. nisargani* sp. n.

Distribution. Grenada, Guyana, Venezuela (new record), Brazil, Bolivia (new record) and Paraguay.

Remarks. The presence or absence of a pair of spiracles on the seventh pedal segment is traditionally used in the diagnosis of some genera of Scolopendromorpha. Di et al (2010) presented arguments for why the taxonomic value of this character is exaggerated, and concluded that the segment 7 spiracle is a reliable character to the species level, but probably not at the generic level. Chamberlin (1915), in the description of the genus *Tidops*, quoted eleven pairs of elliptical spiracles, a pair on the seventh pedal segment, the same condition as in the sister group *Newportia*. Schileyko and Stagl (2004) noted that, in a large number of specimens of *T. collaris*, spiracles are absent on the seventh pedal segment. I was not able to check this character in the holotype of *T. simus* because the specimen was mounted on a slide, however, according to all specimens examined in this study, no spiracles are present on the seventh pedal segment. Chamberlin (1915) also described “a conspicuous cylindric process at ventroectal corner of distal end of the tibia of the ultimate legs” in *T. simus* (cf. Chamberlin (1915) plate 1, fig. 6). This cylindric process was also observed in a speci-

men from Brazil identified in this study as *T. simus*, and for the first time in some specimens of *T. balzanii*. In addition, the tarsus of the ultimate legs of *T. simus* and *T. balzanii* are strongly clavate. In *T. nisargani* and in *T. collaris* the cylindric process on the tibia was not present, but in *T. nisargani* there is a small expansion on the ventral end of the tarsus 1 in a few specimens. This distal cylindrical process on the tibia and the ventral expansion of the distal portion of the tarsus 1 in *T. simus* and *T. balzanii* may be a character of the males of these species, though more specimens are needed to confirm this hypothesis.

***Tidops simus* Chamberlin, 1915**

http://species-id.net/wiki/Tidops_simus

Tidops simus Chamberlin, 1915: 496. Attems, 1930: 285. Schileyko & Minelli, 1999: 296. Schileyko & Stagl, 2004: 125.

Type material: Holotype (MCZ 14550, examined) GRENADA: Richmond Hill, 1910, coll. G. M. Allen and C. T. Brues.

Additional material: (ZMUC) 1 specimen, BRAZIL: “Brasilien”, Pará, Santarém, Taperinha, 9-XI-1970, Ove Jensen.

Diagnosis. Prefemur of the ultimate legs with three ventral spinal processes, and femur with two. With a cylindric process at ventral corner of distal end of the tibia of the ultimate legs. Tarsus 1 of the ultimate legs clavate. (*cf.* Chamberlin (1915) plate 1, fig. 6). Femur and tibia of equal length; second tarsus divided into 9-11 “pseudoarticles”. Tooth plates dentiform longer than wide. Coxopleural process medium to short.

Remarks. The holotype of *T. simus* is mounted on a slide and almost all pieces are broken. The specimen has been mounted ventrally and it is not possible to examine characters of the dorsal part and the legs, which are missing. The only relevant character which could be observed was the forcipular coxosternum. I have found a specimen of *Tidops* from Brazil that was assigned as *T. simus* mainly on the characters of the ultimate legs and the tooth plates (i.e., their diagnostic length/width ratio). The prefemur of the ultimate legs has a series of three ventral spinous processes and the femur one or two. The tibia has a cylindric process at ventral corner of distal end and tarsus 1 clavate as described to the holotype of *T. simus* by Chamberlin (1915). Different from the holotype, the specimen from Brazil showed a very short expansion at ventral corner of distal end of the femur. Tarsus 2 is divided into 11 articles in one leg and 9 in the other. The tooth plates are longer than wide.

Type locality. Richmond Hill, Grenada.

Distribution. Grenada and Brazil (new record).

***Tidops balzanii* (Silvestri, 1895)**

http://species-id.net/wiki/Tidops_balzanii

Figures 1–4

Newportia balzanii Silvestri, 1895a: 767. Silvestri, 1895b: 2. Kraepelin, 1903: 92. Attems, 1930: 277. Bücherl, 1941a: 337.

Tidops balzanii Schileyko & Minelli, 1999: 293. Schileyko, 2002: 499.

Material examined. (BMNH) 1 specimen, Guyana-Brazil: 19-VII-1937, H. E. Hinton; (IBSP 1546) 1 specimen, BRAZIL: Tocantins, Palmas, UHE. Luis Eduardo Magalhães, Margem direita TO-10, Km1.5, 03-IX-2001, I. Knysak, R. Martins & G. Puerto; (IBSP 1559) 1 specimen, Tocantins, Palmas, UHE. Luis Eduardo Magalhães, 30-XI-2000, I. Knysak, R. Martins & G. Puerto; (IBSP 2783) 2 specimens, Tocantins, Porto Nacional, I. Knysak, R. Martins & G. Puerto; (IBSP 751) 1 specimen, Goiás, Aragarças, 18-III-1953, H. Sick; (MNRJ 15303) 10 specimens, Goiás, Jandaia, Fazenda Sr. João Batista Ferreira, 04-VI-2007, A. Chagas, A. Giupponi, A. Kury & A. Pérez; (MNRJ 15356) 3 specimens, Goiás, Paraúna, 30-XII-2006, Chagas-Jr, A., Segal, B. & Chagas, C. S.; (IBSP 710) 1 specimen, São Paulo, Pirassununga, 10-VI-1952, O. Schubart; (IBSP 704) 1 specimen, São Paulo, Pirassununga (Baguassu), 10-VI-1952, O. Schubart; (IBSP 93) 1 specimen, São Paulo, Corumbataí, 02-X-1933, S. Burian; (IBSP 180) 1 specimen, São Paulo, Amparo, 10-VI-1944, A. das Neves; (NMNH) 2 specimens, Rio Grande do Sul, Jaguarão, 28-I-1963, C. S. Carbonell leg.; (NMNH) 3 specimens, BOLIVIA: Huachi, W. M. Mann; (ZMH) 1 specimen, PARAGUAY, Puerto Max, Paraguay river, 9-III-1905.

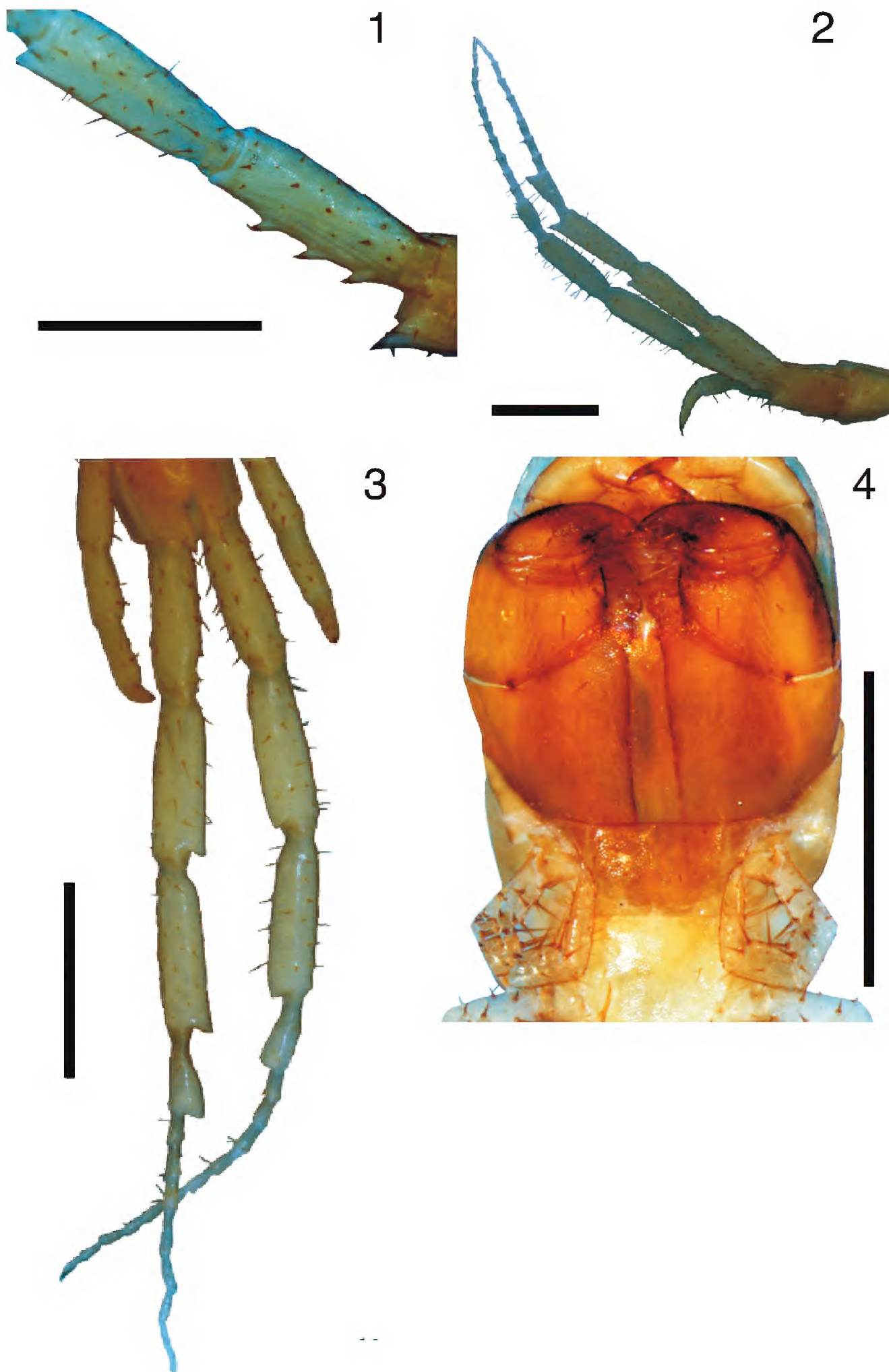
Diagnosis. Prefemur of the ultimate pair of legs with three ventral spinous processes (Figure 1); femur and tibia each without ventral spinous process (Figure 2); femur and tibia each with a small cylindric process at ventral corner of distal end and tarsus 1 clavate (Figure 3). Tarsus 2 with 11 or 12 “pseudoarticles”. Tibia longer than or equal to femur. Tooth plates short, dentiform wider than long (Figure 4). Coxopleural process medium to short.

Remarks. The legs of *T. balzanii* are hirsute; articles of the ultimate legs are usually shorter than in the other three species of the genus.

A specimen at the Zoologisches Museum Hamburg, Hamburg, Germany is labeled as “Type Mus. Turin, Argentina: Rio Apa, (C-VI-1903)” and was identified as *N. balzanii*. I am not sure if this specimen corresponds to the holotype of *N. balzanii*.

Type locality. Rio Apa, Paraguay.

Distribution. Brazil (Tocantins, Goiás, São Paulo and Rio Grande do Sul), Bolivia (new record) and Paraguay.



Figures 1–4. **1** *Tidops balzanii* (IBSP 1559). Prefemur and femur of the ultimate leg showing ventral spinous processes of the prefemur. Lateral view **2** *Tidops balzanii* (IBSP 1559). Ultimate legs. Lateral view **3** *Tidops balzanii* (IBSP 1559). Ultimate legs. Ventral view **4** *Tidops balzanii* (IBSP 1559). Forcipules. Ventral view. Scale bar 1 mm.

***Tidops collaris* (Kraepelin, 1903)**

http://species-id.net/wiki/Tidops_collaris

Figures 5–7

Newportia collaris Kraepelin, 1903: 90.

Newportia bicegoi Brölemann, 1905: 67. Kraepelin, 1903: 93. Attems, 1930: 278. Bücherl, 1939: 298. Bücherl, 1941a: 337. Bücherl, 1974: 124. Schileyko & Minelli, 1999: 293.

Newportia bicegoi bicegoi Brölemann, 1905: 67. Attems, 1930: 278. Bücherl, 1939: 298. Bücherl, 1941a: 337. Bücherl, 1974: 124.

Newportia bicegoi collaris Brölemann, 1905: 67. Attems, 1930: 279. Bücherl, 1941b: 134. Bücherl, 1941a: 337. Bücherl, 1974: 124.

Tidops echinopus Chamberlin, 1921: 4. Attems, 1930: 286. Bücherl, 1941a: 341. Schileyko & Minelli, 1999: 296.

Tidops collaris Schileyko & Minelli, 1999: 296. Schileyko, 2002: 499. Schileyko and Stagl, 2004: 125. Edgecombe & Koch, 2009: fig. 1C, D, fig. 2A-E.

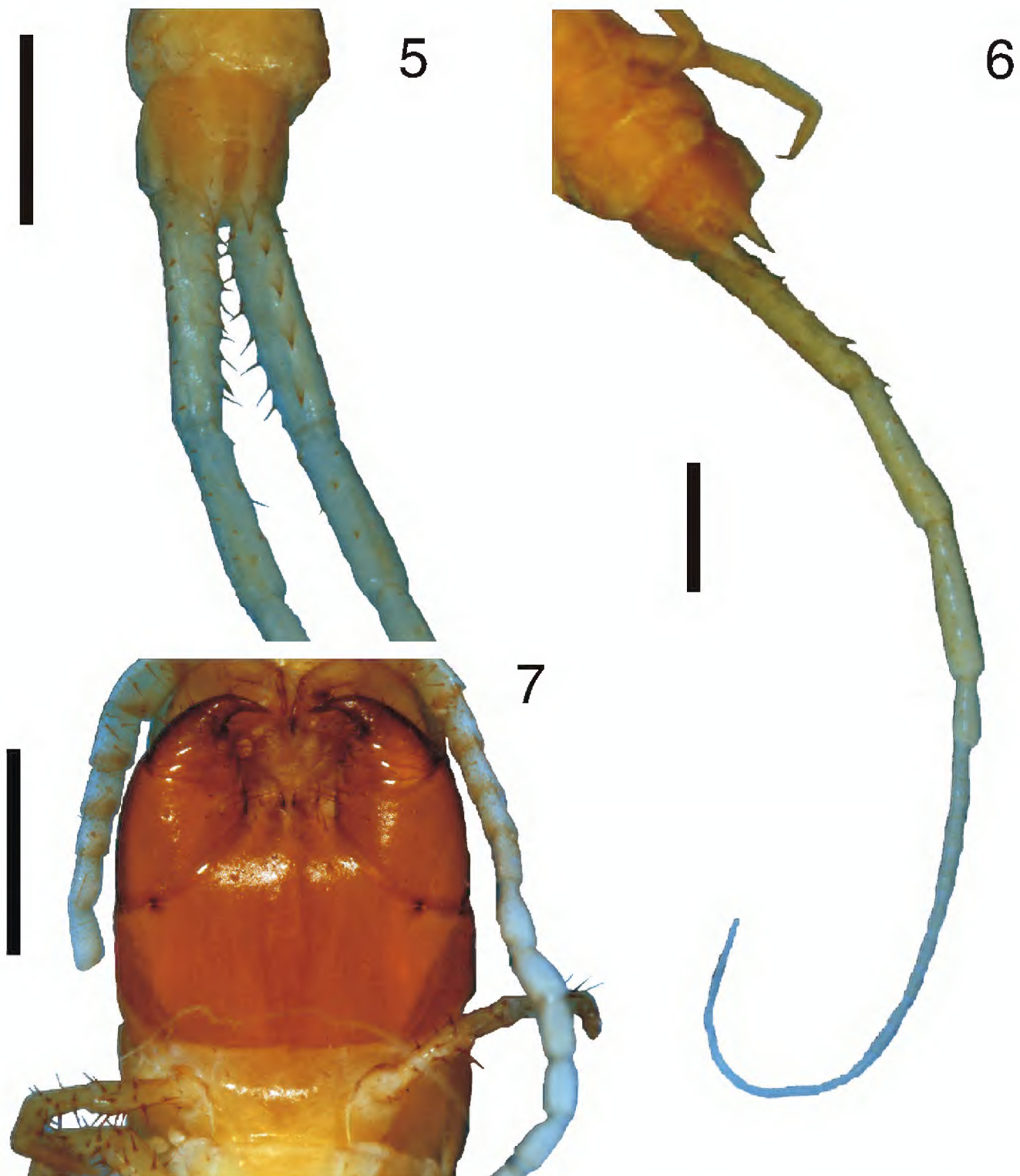
Kartops guianae Archey, 1923: 114. Attems, 1930: 266. Bücherl, 1941a: 333. Bücherl, 1974: 128. New synonymy.

Type material. Holotype (ZMH, examined) 1 specimen, Bas Carsevenne, (Mus. Paris, C 26-VII-03); paratypes (MNHN, examined) 4 specimens, Bas Carsevenne, 1889, F. Geay.

Types of junior subjective synonyms: *T. echinopus*, holotype (MCZ 14320, examined), GUYANA: Sand Hill Forest, 2nd Mourie, 19.VIII, 1914, coll. F. M. Gaige; paratypes (MCZ, examined) 3 vials; *Newportia bicegoi*, types (MNHN DCCCIXXI, DCCCLXXI, examined) 3 specimens, BRAZIL: Amazonas, "Manaos", Bicego leg.; *Kartops guyanae*, holotype (CMNZ, examined), GUYANA, Kartabo, Bartica District, 1920.

Additional material: (NMNH 31269) 4 specimens, GUYANA: Kartabo, Bartica District, 1922 and 17-IV-1924; (NMNH 31975) 6 specimens, Kartabo, Bartica District, 1922 and 8-V-1924; (MNRJ 15355) 2 specimens, VENEZUELA: Edo. Amazonas, Tobogan de La Selva, XII-2002, Pérez-González, A., Giupponi, APL. & Manzanilla, O.; (AMNH) 1 specimen, BRAZIL: Amazonas, Manaus, T. Gilliard; (ZMUC) 3 specimens, Pará, Santarém, Taperinha, 9-11-1970, Ove Jensen; (MCZ 31123) 3 specimens, Pará.

Diagnosis. Prefemur of the ultimate legs with four larger ventral spinous processes (Figure 5). Femur with two ventral and one medial spinous process, and tibia without (Figure 6). Femur and tibia without cylindric process at ventral corner of distal end; Femur equal to or a little longer than the tibia. Tarsus 1 not clavate. Tarsus 2 with 21 "pseudoarticles". The tooth plates short (Figure 7), with the lateral side higher than the medial side, but differing from *T. simus* in being wider than long. Coxopleural process median to long.



Figures 5–7. **5** *Tidops collaris* (MCZ 31123). Ultimate legs showing the ventral spinous processes of the prefemur and the 2 ventral and 1 median spinous processes of the femur. Ventral view **6** *Tidops collaris* (MCZ 31123). Ultimate legs. Ventral view **7** *Tidops collaris* (MCZ 31123). Forcipules Ventral view. Scale bar 1 mm.

Remarks. The obscure and monotypic genus *Kartops*, that appears in a clade with *Newportia* and *Tidops* in Schileyko and Pavlinov (1997), was here examined for the first time since its description. *Kartops* was proposed by Archey (1923) for a scolopendromorph that clearly resembled *Tidops*, but according to him differed by three characters: (1) the number of spiracles, (2) presence of a “socketed spine tibialis” (i.e., a tibial spur), and (3) the anterior armor of the prosterum (Archey 1923). Schileyko (2002) disputed the distinction between the two genera and placed *Kartops* in subjective synonymy with *Tidops*. The type species of *Kartops*, *K. guyanae*, is mounted on a slide, which is housed in the Canterbury Museum in New Zealand. The slide is in poor

condition and it is only possible to verify the shape of the forcipula, which resembles that of all species of *Tidops*. Although the holotype does not allow the observation of many details described by Archey (1923), ten specimens from Kartabo, the type locality of *K. guyanae*, here identified as *T. collaris*, were examined and compared to the type material and the original description of *T. collaris*. The main characters used by Archey (1923) to diagnose *Kartops*, namely the number of spiracles, presence of a spur on the tibia and blunt processes on the anterior margin of the forcipular coxosternum are present in all species of *Tidops*. There are no details of the characters of the ultimate pair of legs that were lost when collected and so were not described. All other characters of *K. guyanae* agree with those of the specimens from Kartabo. Therefore, *K. guyanae* should be considered synonymous under *T. collaris*.

Type locality. Bas Carsevenne, French Guyana (this locality now belongs to Amapá State, in Brazil).

Distribution. French Guyana (Kraepelin 1903, Attems 1930; Bücherl 1941a, b, 1974 Schileyko and Minelli 1999), Guyana, Venezuela (new record), Brazil and Paraguay (Schileyko and Stagl 2004).

***Tidops nisargani* sp. n.**

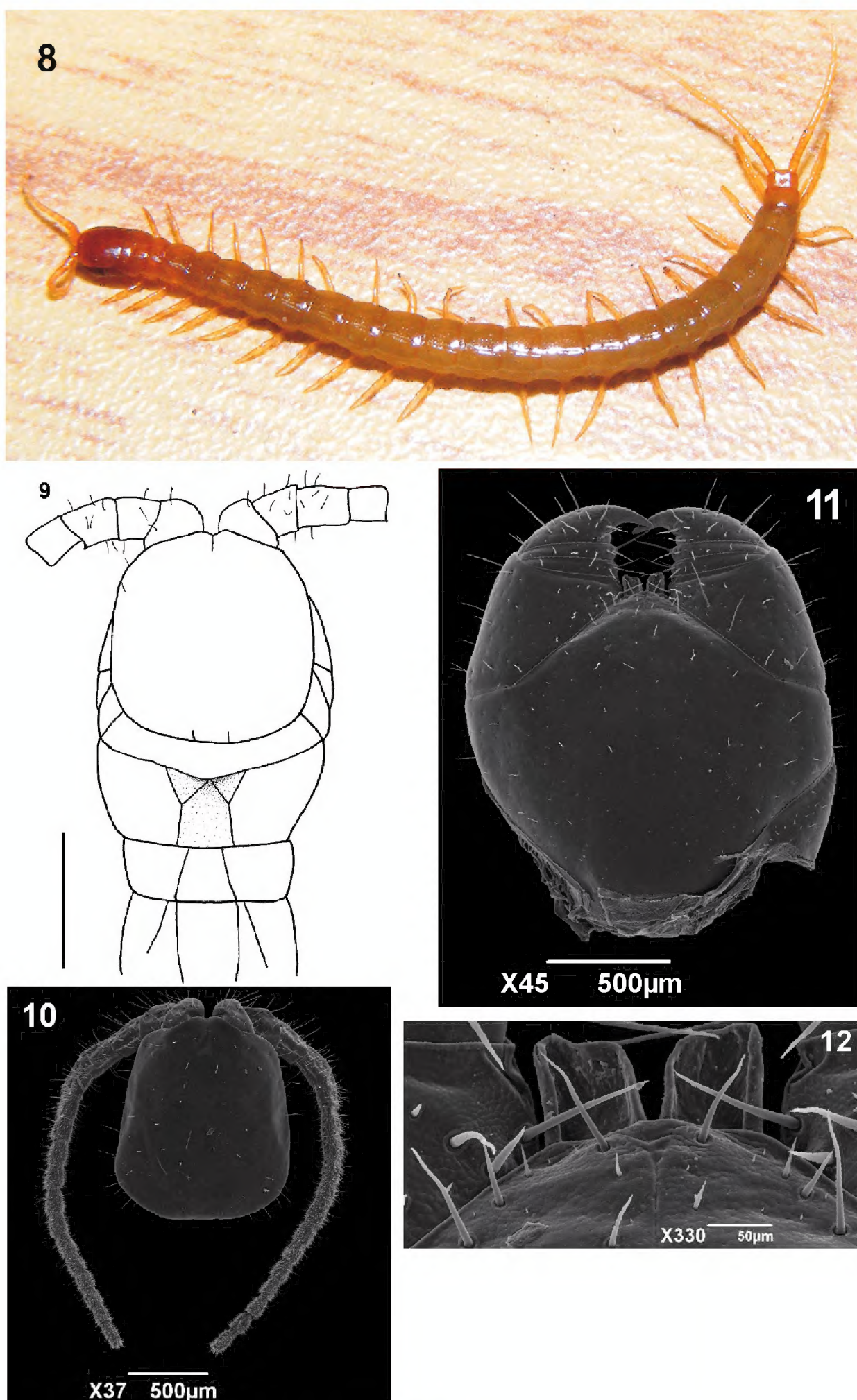
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http://species-id.net/wiki/Tidops_nisargani

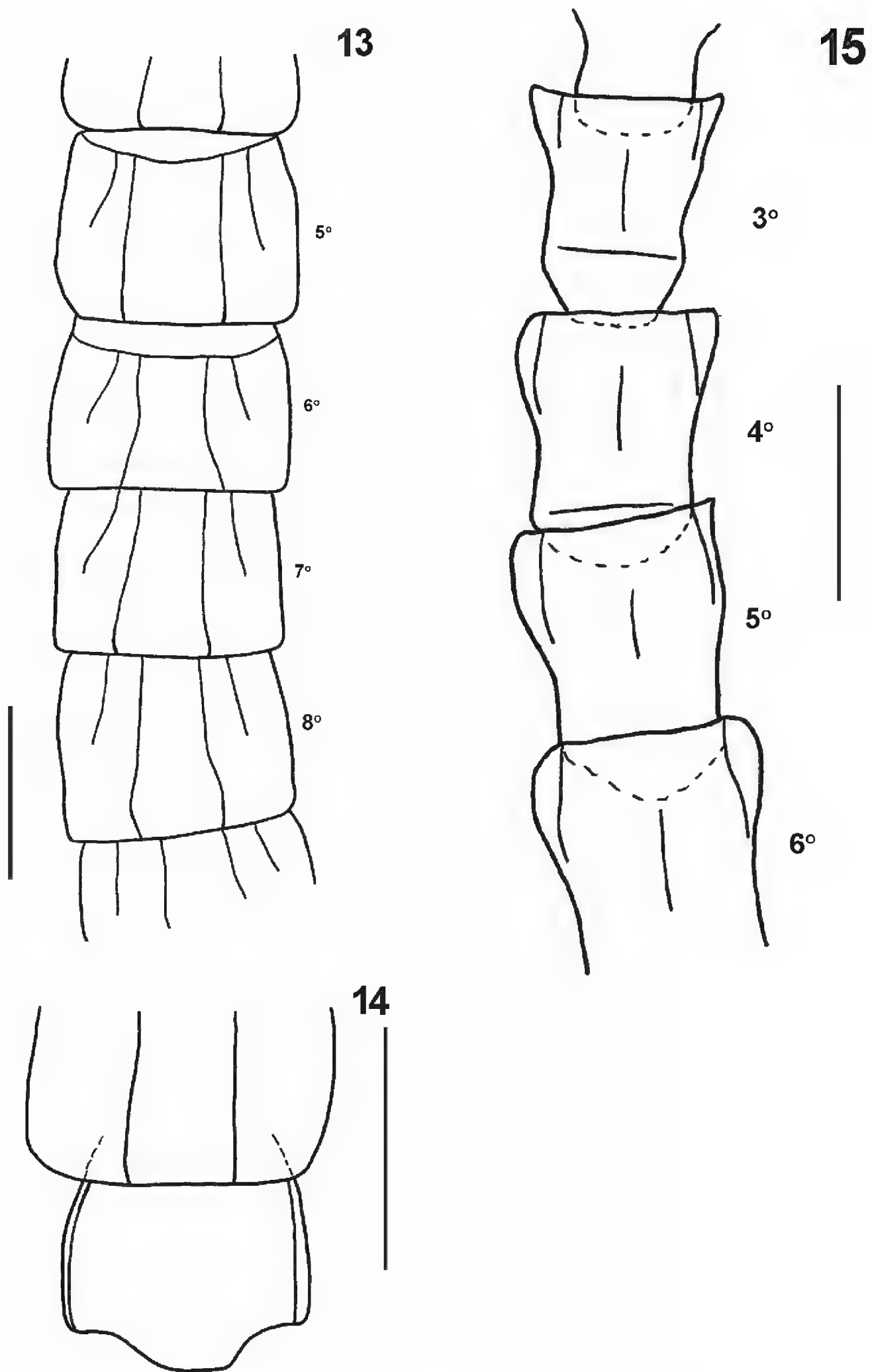
Figures 8–23

Type specimens. Holotype (MNRJ 15350), BRAZIL, Bahia, Porto Seguro, Arraial d'Ajuda, 2006 (without specific day and month of collect), Chagas-Jr, A.; Paratypes (MNRJ 15351) 4 specimens, Bahia, Porto Seguro, Arraial d'Ajuda, 2005, Chagas-Jr, A. & Segal, B.; (MNRJ 15499) 7 specimens, Bahia, Porto Seguro, Arraial d'Ajuda, 24-27-ii-2005, Expedição Arachné; (MNRJ 15349) 6 specimens, Bahia, Porto Seguro, Trancoso, 19-vi-2005, Chagas-Jr, A., Segal, B. & Vasconcelos, E.

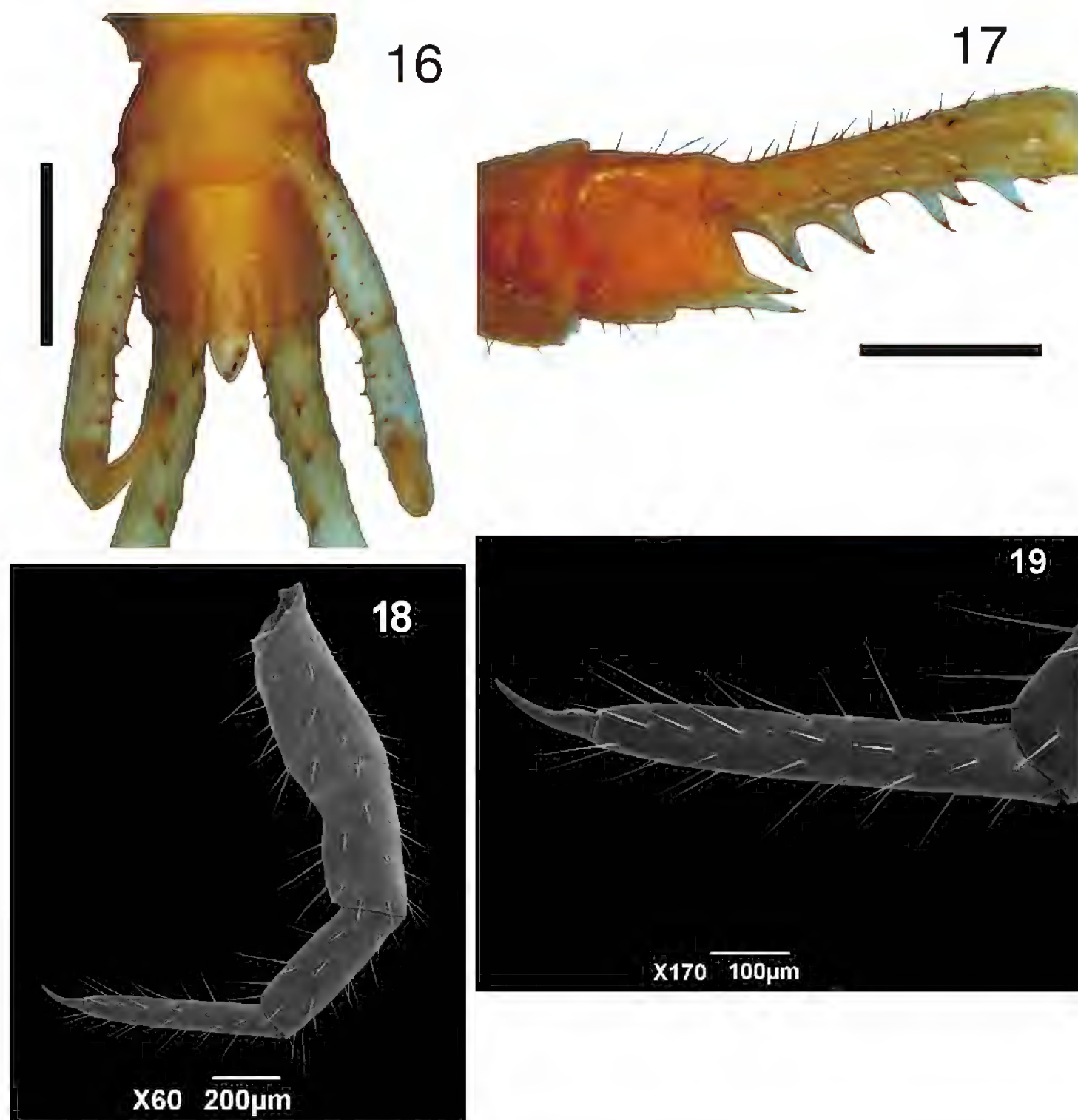
Additional material. BRAZIL: (MNRJ 15353) 1 specimen, Amazonas, Manaus, i-2001, Pedroso, D.; (MPEG) 6 specimens, Pará, Marabá, Benfica, 15-iii-2003/25-iv-2003, J. Mathieuz & M. Martins; (MNRJ 15352) 11 specimens, Bahia, Alcobaça, Fazenda Santa Bahia, 27-28-II-2005, Expedição Arachné; (MNRJ 15354) 9 specimens, Bahia, Porto Seguro, Arraial D'Ajuda, 24-27-II-2005, Expedição Arachné; (MNRJ 15509) 3 specimens, Bahia, Una, REBIO de Una, 08-10-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15510) 1 specimen, Bahia, Jequié, Brejo Novo, 06-07-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15511) 3 specimens, Bahia, Camacan, RPPN Serra Bonita, 11-13-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15512) 3 specimens, Bahia, Una, REBIO de Una, 08-10.vi.2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15513) 3 specimens, Bahia, Porto Seguro, Parque Nacional do Pau Brasil, 14-17-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15514) 3 specimens, Bahia, Porto Seguro,



Figures 8–12. **8** *Tidops nisargani* sp. n. Habitus **9** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). Cephalic plate and the first three tergites. Dorsal view. Scale bar 1 mm **10** *Tidops nisargani* sp. n. (MNRJ). Cephalic plate showing the pilosity of the antennae. Dorsal view. Scale bar 50 μ m **11** *Tidops nisargani* sp. n. (MNRJ). Forcipules, showing the coxosternal tooth plates. Ventral view. Scale bar 500 μ m **12** *Tidops nisargani* sp. n. (MNRJ). Detail of the tooth plates. Ventral view. Scale bar 50 μ m.



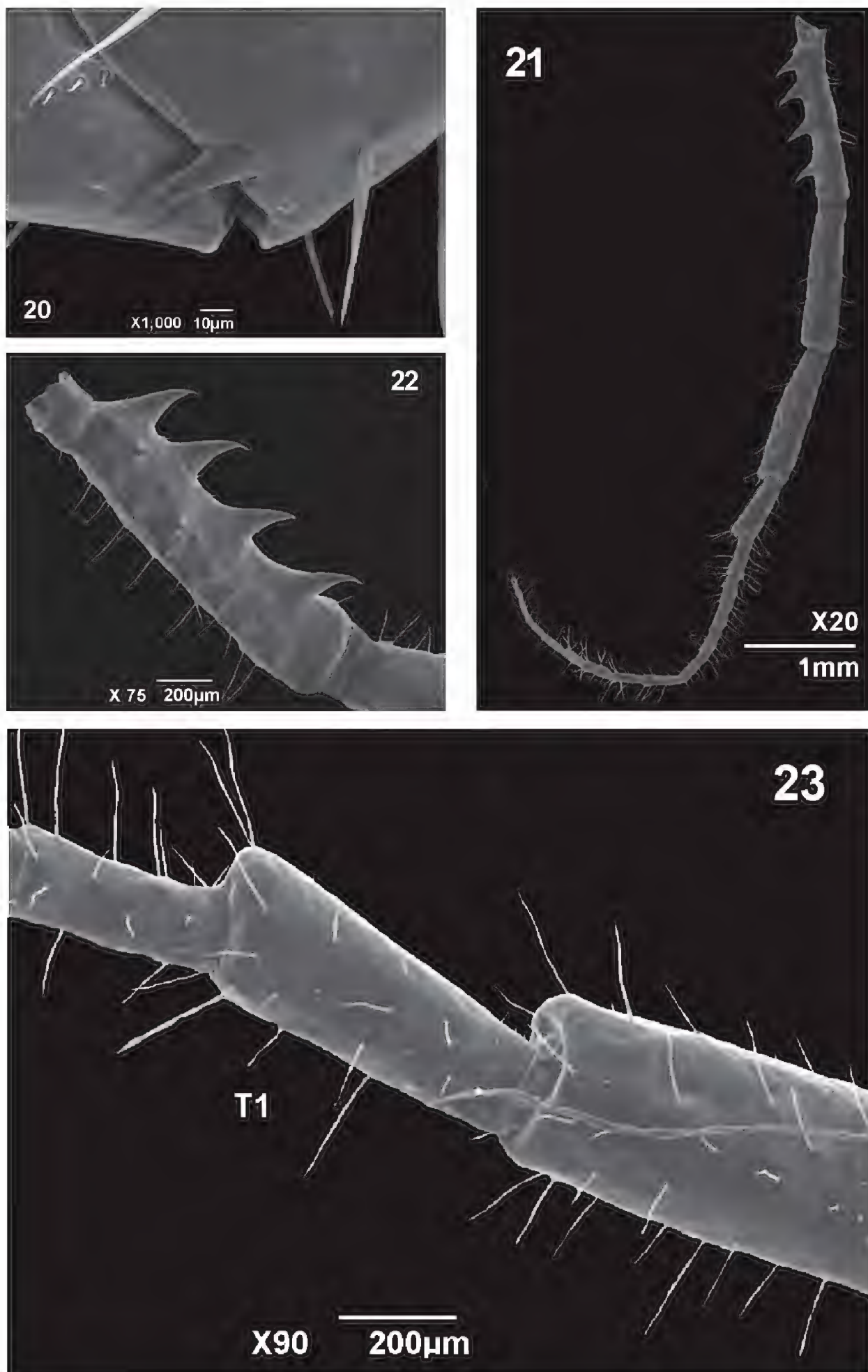
Figures 13–15. **13** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). Tergites 5 to 8 showing the paramedian and anterior lateral sutures. Dorsal view **14** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). 23rd tergite **15** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). Sternites 3 to 6. Scale bar 1 mm.



Figures 16–19. **16** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). Segments 22 and 23 showing 23rd sternite, ventral view **17** *Tidops nisargani* sp. n. Holotype (MNRJ 15350). Coxopleuron. Lateral view. Scale bar 1 mm **18** *Tidops nisargani* sp. n. (MNRJ). 8th locomotory leg. Lateral view. Scale bar 200 μm **19** *Tidops nisargani* sp. n. (MNRJ). Detail of the tarsus 1 of the 8th locomotory leg. Lateral view. Scale bar 100 μm.

Parque Nacional do Pau Brasil, 14-17-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15515) 8 specimens, Bahia, Camacan, RPPN Serra Bonita, 11-13-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.; (MNRJ 15516) 1 specimen, Bahia, Camacan, RPPN Serra Bonita, 11-13-vi-2009, Chagas-Jr, A., Kury, A., Pedroso, D., Giupponi, A. & Dill, V.

Etymology. The specific epithet refers to the “Sítio Nisargan” in Arraial d’Ajuda, Bahia, where the new species was collected and where I lived from 2004 to 2006.



Figures 20–23. **20** *Tidops nisargani* sp. n. Holotype (MNRJ). Detail of the tibial spine in the 8th locomotory leg. Lateral view. Scale bar 10 µm **21** *Tidops nisargani* sp. n. Holotype (MNRJ). Ultimate leg. Lateral view. Scale bar 1 mm **22** *Tidops nisargani* sp. n. Holotype (MNRJ). Detail of the prefemur of the ultimate leg showing the ventral spinous processes. Lateral view. Scale bar 10 µm **23** *Tidops nisargani* sp. n. Holotype (MNRJ). Detail of tarsus 1 of the ultimate leg showing the distal expansion. Lateral view. Scale bar 200 µm.

Diagnosis. Prefemur of the ultimate legs with four larger spinous processes, femur and tibia without ventral and medial spinous processes; femur and tibia without cylindric process at ventral corner of distal end, but tarsus 1 with a small expansion at ventral corner of distal end; tibia shorter than femur; tarsus 2 with 9 to 15 “pseudoarticles”. The tooth plates longer than wide. The anterior margin of the tooth plates is straight with the lateral sides longer than the medial sides; the inner face of each dentiform tooth plate is concave like a longitudinal section of a cylinder. Coxopleural process moderately long.

Description. Body length: 22 to 28 mm (without ultimate legs); body in general yellowish (Figure 8). Cephalic plate and forcipular coxosternum brownish; antennae and legs yellowish. Cephalic plate smooth, with a short median suture on the anterior margin and a paired of short paramedian short sutures arising from posterior margin which overlies the first tergite (Figure 9).

Antennae composed of seventeen articles, first three (or four) articles glabrous, but with some long bristles, the succeeding ones becoming more densely clothed with fine short hairs (Figure 10).

Anterior margin of the forcipular coxosternum straight and narrow. The sides of the dentiform tooth plates are straight with the lateral sides longer than the medial sides; the anterior margins are concave (Figure 12). Forcipular coxosternum without sutures; none of the articles of forcipula armed; Tarsungula short and stout, apices alone overlapping in closed position (Figure 11).

Tergites smooth; first tergite with a very distinct anterior transverse sulcus which strongly bends back in an angle at middle, to which is attached a median W-shape sulcus, from each of the posterior apices of which a pair of longitudinal sutures continue to the posterior margin of the tergite (Figure 9). There is a shallow depression in the middle of the anterior transverse sulcus and in the median W-shape. Tergites 2–22 with complete paramedian sutures and tergites 3–19 with lateral longitudinal sutures on the anterior two-thirds of each tergite (Figure 13). Only the 23rd tergite margined. Margin of tergite 23 truncated medially and concave on each side, without a median sulcus, but with a shallow median depression (Figure 14).

Sternites smooth, longer than wide. With a large endosternite, well marked off by a transverse sulcus from the sternites 3–15, extending backwards under the sternites for one-third the length of the later (Figure 15). Sternites 3–21 with a median longitudinal sulcus; sternites 2–21 with two very distinct incomplete longitudinal lateral sutures separating off a narrow area at each side of the anterior portion of the sternites (Figure 15). Sternite 23 shorter than preceding, without sulci, lateral margin slightly convex and converging posteriorly; posterior margin straight, with corners rounded (Figure 16).

Coxopleural process moderately long, with an acute apex (Figure 17). No lateral spines; dorsal and ventral surface of the coxopleuron bearing two long setae. Pores numerous, moderate-sized, evenly covering most of the surface of the coxopleuron (Figure 17).

Legs 1 to 21 with tarsi undivided (Figures 18 and 19), 22nd and 23rd divided. Tibia of the locomotory legs 3 to 20 with lateral distal spurs (holotype) (Figure 20), some specimen without. In all specimens from Amazonas and Pará the tibia of the locomotory legs lack a tibial spur. Ultimate legs slender and with many setae, articles

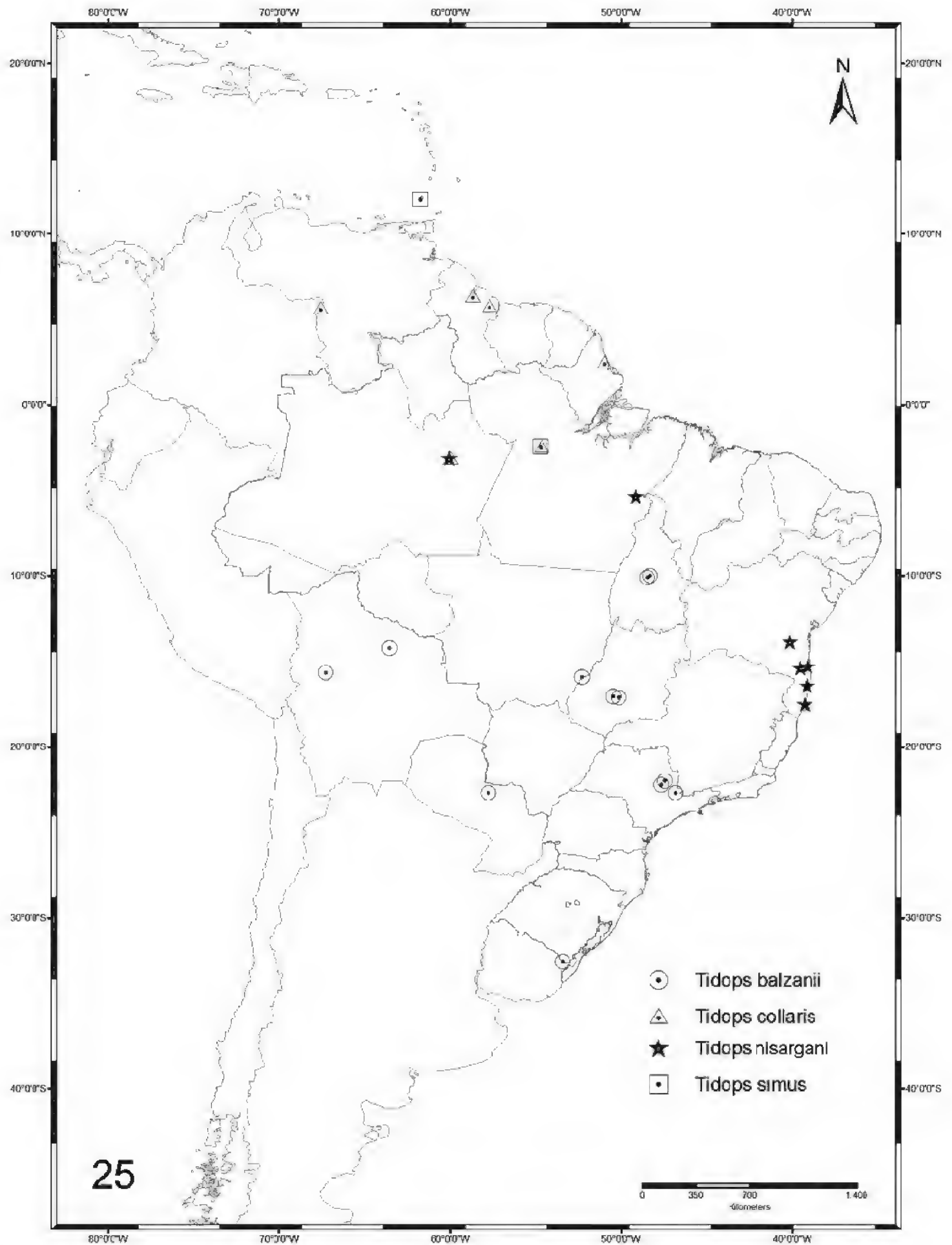


Figure 24. Map showing the distribution of the species of *Tidops* in the Neotropical Region.

usually longer than the articles of the ultimate legs of *T. simus* and *T. balzanii* (Figure 21); prefemur of the ultimate legs with a series of four large ventral processes (Figures 17 and 22) and a series of six or seven setae dorsomedially; femur and tibia without ventral or medial processes or spines, only with fine setae; tibia shorter than femur; femur and tibia without cylindric process at ventral corner of distal end; tarsus 1 short with a small expansion on the ventral corner of distal end (Figure 23); tarsus 2 divided into 9 to 15 distinct tarsomeres or “pseudoarticles”.

Type locality. Sítio Nisargan, Arraial d’Ajuda, Porto Seguro, state of Bahia, Brazil.

Distribution. Brazil (Amazonas, Pará and Bahia).

Discussion

Due to the similar structure of the ultimate legs of species of *Tidops* and *Newportia* these genera have been nearly always placed in a monophyletic clade, the Newportiinae. Schileyko and Pavilnov (1997) carried out the first phylogenetic analysis of the thirty-four valid genera of the order Scolopendromorpha. They evaluated the relationships based on 17 morphological characters using ordered or unordered, weighted or unweighted modes. All resulting trees show *Newportia* and *Tidops* closely related and forming a monophyletic group that in some trees included also *Kartops*, a poorly known genus of uncertain taxonomic position. Later, Schileyko (2002) reassigned *Tidops* from the Newportiinae to the Scolopocryptopinae, but the arguments in support of this reassignment were not given.

Shelley and Mercurio (2005) considered the division of the 2nd tarsus of the ultimate legs into “pseudosegments” as a synapomorphy of Newportiinae, and suggested that Ectonocryptopinae is sister group of (*Newportia* + *Tidops*). Recently, in a study of the systematic position of blind scolopendromorph genera (Cryptopidae and Scolopocryptopidae), Koch et al. (2010) showed new insights on the relationships of Newportiinae. *Tidops* appeared in a basal position relative to *Newportia* and *Ectonocryptoides*, with Ectonocryptopinae (*Ectonocryptoides quadrimerus* Shelley and Mercurio, 2005) arising within Newportiinae, and indeed within *Newportia*. Although the clade Newportiinae + Ectonocryptopinae is well supported by a number of synapomorphies (see Shelley and Mercurio 2005 and Koch et al. 2010), the internal relationships of Newportiinae, with *Ectonocryptoides* within the diverse genus *Newportia*, still needs to be evaluated more cautiously due the weak support for this branch.

Schileyko and Minelli (1999) recognized three species of *Tidops* – *T. simus*, *T. collaris* and *T. balzanii* – however, Schileyko and Stagl (2004) thought that if the genus was revised it would probably be reduced to a single species, *T. collaris*. They believed that, being known only from the type locality, *T. simus* and *T. balzanni*, were probably not valid species. In this study, I examined one additional specimen of *T. simus* and several new specimens of *T. balzanii* from several localities in Brazil, and concluded that the genus is more diverse than Schileyko and Stagl (2004) stated. After the description of

the new species, *T. nisargani*, the genus is composed of four species and their characteristics are summarized in Table 1.

The new species, *T. nisargani*, closely resembles *T. collaris* in the number of spinous ventral processes of the pre-femur of the ultimate pair of legs, but differs in the character of the femur. In the new species and in *T. collaris*, the pre-femur of the ultimate legs is armed with four large ventral spinous processes, but the new species differs from *T. collaris* in the absence of two small ventral and median single spinous process on the femur.

Specimens of *T. nisargani* from Amazonas and Pará also resemble *T. balzanii*. The pre-femur of the ultimate pair of legs is armed with three ventral spinous processes, the same number as seen in *T. balzanii*, however, these specimens differ from *T. balzanii* in the length of the tibia, the length of the coxopleural process and by the pilosity of the body and legs. In the new species the tibia is shorter than the femur, the coxopleural process is long to medium, and the body and legs are not very pilose whereas in *T. balzanii* the tibia is longer than or equal to the femur, the coxopleural process is medium to short, and the body and legs are more pilose than in the new species.

The genus *Tidops* occurs almost exclusively in South America, distributed from the northernmost country (Venezuela) to the extreme south of Brazil (Jaguarão, state of Rio Grande do Sul) (Figure 24). There is a single record of *T. simus* in the Lesser Antilles and no occurrence of the genus in Central America. The remaining species – *T. simus*, *T. collaris* and *T. nisargani* – occur further north in South America. *Tidops simus*, formerly known only from Grenada, but is here recorded from Santarém, state of Pará, Brazil. *Tidops collaris* is widely distributed in northern South America (Venezuela, Guyana and northern Brazil), except for one record of four specimens from San Lois in Paraguay published by Schileyko and Stagl (2004). This species occurs almost exclusively in the Amazon rainforest, sympatrically with *T. nisargani* in Manaus, state of Amazonas and with *T. simus* in Taperinha, Santarém, state of Pará. *Tidops balzanii* is also a species with a wide distribution, occurring in open areas such as the Brazilian “Cerrado”, open areas of Bolivia and the Paraguayan Chaco. The northern distribution limit for *T. balzanii* is Palmas, state of Tocantins and its southernmost distribution is Jaguarão in Rio Grande do Sul, bordering on Uruguay. *Tidops nisargani* is endemic from Brazil. It is distributed mainly in the Atlantic Forest of northeastern Brazil in the state of Bahia, but was also reported from the Amazonian rainforest in Manaus, state of Amazonas and in Marabá, state of Pará. Its disjunct distribution is similar to the biogeographic patterns of other groups of terrestrial arthropods such as Schizomida (*Rowlandius linsduarteae* Santos et al. 2008), and also centipedes such as *Otostigmus goeldii* Brölemann, 1898 and the Brazilian genus *Scolopendropsis* Brandt, 1841, both occurring in the Atlantic forest of northeastern Brazil and in the Amazonian Forest.

Some historical records for *T. collaris* such as Carsevenne “Contesté Franco Brésilien” are now Brazil, state of Amapá. I found a specimen of *T. balzanii* from Rio Apa, Argentina. This specimen was probably collected by Capitano G. Bove or by L. Balzan in their travels to Argentina and Paraguay, respectively, or by Alfredo Borelli in his travels to Argentina and Paraguay. According Silvestri (1895a, b), I believed this specimen is from Paraguay rather than from Argentina as it was transcribed in the label of the specimen examined, because he always cited Rio Apa as belonging to Paraguay rather than to Argentina.

Table 1. Comparative data for *T. simus*, *T. balzanii*, *T. collaris* and *T. nisargani* sp. n.

Characters	Species			
	<i>T. simus</i>	<i>T. balzanii</i>	<i>T. collaris</i>	<i>T. nisargani</i>
Tooth plate	Longer than wide	Wider than long	Wider than long	Longer than wide
Distal margin of the tooth plate	Rounded	Rounded	Straight	Straight
Tibial lateral spurs	Present	Present	Present	Present or absent
Coxopleural process	Short	Short to medium	Medium to long	Medium to long
Prefemur of the ultimate legs	3 ventral spinous processes	3 ventral spinous processes	4 ventral spinous processes	4 (3) ventral spinous processes
Femur of the ultimate legs	1 or 2 ventral spinous processes	without spinous processes	2 ventral and 1 median spinous process	without spinous processes
Number of tarsomeres in tarsus 2 of the ultimate legs	9 to 11	11 to 13	19 to 21	9 to 15
Ventral cylindric process of the ultimate legs	On the femur, tibia and tarsus 1	On the femur, tibia and tarsus 1	Absent	Small distal expansion on tarsus 1
Distribution	Grenada and Brazil	Brazil, Bolivia and Paraguay	Guyana, Venezuela, Brazil and Paraguay	Brazil

Conclusions

The genus *Tidops* is now composed of four species: *T. simus*, *T. collaris*, *T. balzanii* and *T. nisargani* sp. n. No specimens studied had a pair of spiracles on the seventh trunk segment. The ventral distal cylindric process present in the tibia of the ultimate pair of legs described for *T. simus* was also observed in *T. balzanii* as well as the distal enlargement of tarsus 1 of these species.

Kartops guianae, the only one species of the genus *Kartops*, was synonymized under *T. collaris*. *Tidops* is a genus typically from South America, with only one record for the Lesser Antilles. The four species of the genus occur in Brazil.

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References

- Archey G (1923) A new genus of Chilopoda from British Guiana, and a new species of *Wailamyctes* from Auckland Island. Records of the Canterbury Museum 2(3): 113–117.
- Attems C (1930) Myriapoda 2. Scolopendromorpha. In: Schulze FE, Kükenthal W (Eds) Das Tierreich 54. Walter de Gruyter, Berlin, 1–308.
- Bonato L, Edgecombe GD, Lewis JGE, Minelli A, Pereira LA, Shelley RM, Zapparoli M (2010) A common terminology for the external anatomy of centipedes (Chilopoda). ZooKeys 69: 17–51. doi: 10.3897/zookeys.69.737
- Brölemann HW (1905) Myriapodes du Museu Paulista II^o mémoire: Manaus. Revista do Museu Paulista 6: 63–96.
- Bücherl W (1939) Os quilopodos do Brasil. Memórias do Instituto Butantan 13: 43–362.
- Bücherl W (1941a) Quilópodos novos da coleção do Museu Nacional do Rio de Janeiro. Memórias do Instituto Butantan 15: 119–146.
- Bücherl W (1941b) Catálogo dos Quilópodos da zona neotrópica. Memórias do Instituto Butantan 15: 251–372.
- Bücherl W (1974) Die Scolopendromorpha der Neotropischen Region. Symposia of the Zoological Society of London 32: 99–133.
- Chamberlin RV (1915) New chilopods from Mexico and the West Indies. Bulletin of the Museum of comparative Zoology 59(8): 495–541.
- Chamberlin RV (1921) Results of the Bryant Walker Expeditions of the University of the Michigan to Colombia, 1913, and British Guiana, 1914. Occasional Papers of the Museum of Zoology 97: 1–28.
- Di Z-Y, Cao Z-J, Wu Y-L, Yin S-J, Edgecombe GD, Li W-X (2010) Discovery of the centipede family Plutonidiumidae (Chilopoda) in Asia: a new species of *Theatops* from China, and the taxonomic value of spiracle distributions in Scolopendromorpha. Zootaxa 2667: 51–63.
- Edgecombe GD, Koch M (2009) The contribution of preoral chamber and foregut morphology to the phylogenetics of Scolopendromorpha (Chilopoda). Soil Organisms 81: 295–318.
- Koch M, Edgecombe GD, Shelley RM (2010) Anatomy of *Ectonocryptoides* (Scolopocryptopidae: Ectonocryptopinae) and the phylogeny of blind Scolopendromorpha (Chilopoda). International Journal of Myriapodology 1: 51–81. doi: 10.1163/187525410X12578602960344
- Kraepelin K (1903) Revision der Scolopendriden. Mitteilungen aus dem naturhistorischen Museum in Hamburg 20: 1–276.

- Lewis JGE, Edgecombe GD, Shelley RM (2005) A proposed standardised terminology for the external taxonomic characters of the Scolopendromorpha (Chilopoda). *Fragmenta Faunistica* 48(1): 1–8.
- Schileyko AA (2002) Scolopendromorpha. In: Adis J (Ed) *Amazonian Arachnida and Myriapoda*. Pensoft, Sofia, Moscow, 479–500.
- Schileyko AA, Minelli A (1999) On the genus *Newportia* Gervais, 1847 (Chilopoda, Scolopendromorpha, Newportiidae). *Arthropoda Selecta* 7(4): 265–299.
- Schileyko AA, Pavilnov IJ (1997) A cladistic analysis of the order Scolopendromorpha (Chilopoda). *Entomologia Scandinavica* 51 (Supplement): 33–40.
- Schileyko AA, Stagl V (2004) The collection of scolopendromorph centipedes (Chilopoda) in the Natural History Museum in Vienna: a critical re-evaluation of former taxonomic identifications. *Annalen des Naturhistorische Museums in Wien* 105(B): 67–137.
- Shelley R, Mercurio R (2005) *Ectonocryptoides quadrimeropus*, a new centipede genus and species from Jalisco, Mexico; proposal of Ectonocryptopinae, analysis of subfamilial relationships, and a key to subfamilies and genera of the Scolopocryptopidae (Scolopendromorpha). *Zootaxa*, 1094: 25–40.
- Silvestri F (1895a) Chilopodi e diplopodi raccolti dal Capitano G. Bove e dal Prof. L. Balzan nell'America Meridionale. *Annali del Museo Civico di Storia Naturale di Genova* 34: 764–783.
- Silvestri F (1895b) Viaggio deo dottor Alfredo Borelli nella Republica Argentina e nel Paraguay XIV. Chilopodi e Diplopodi. *Bolletino dei Musei di Zoologia ed Anatomia Comparata* 10 (203): 1–12.